From the INTERNATIONAL BUREAU

# PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
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ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

| | |
|---|---|
| **Date of mailing** (day/month/year)<br>21 December 1999 (21.12.99) | |
| **International application No.**<br>PCT/SE99/00500 | **Applicant's or agent's file reference**<br>2996154 |
| **International filing date** (day/month/year)<br>26 March 1999 (26.03.99) | **Priority date** (day/month/year)<br>27 March 1998 (27.03.98) |
| **Applicant**<br>OHLANDER, Roland et al | |

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

27 October 1999 (27.10.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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| **The International Bureau of WIPO**<br>**34, chemin des Colombettes**<br>**1211 Geneva 20, Switzerland** | Authorized officer<br>A. Karkachi |
| Facsimile No.: (41-22) 740.14.35 | Telephone No.: (41-22) 338.83.38 |

**PCT** WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

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**F01N 3/24, B01D 27/08** | **A1**

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(22) International Filing Date: 26 March 1999 (26.03.99)

(30) Priority Data:
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(71) Applicant *(for all designated States except US)*: SCANDFILTER AB [SE/SE]; S-512 85 Svenljunga (SE).

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(74) Agent: AWAPATENT AB; P.O. Box 11394, S-404 28 Göteborg (SE).

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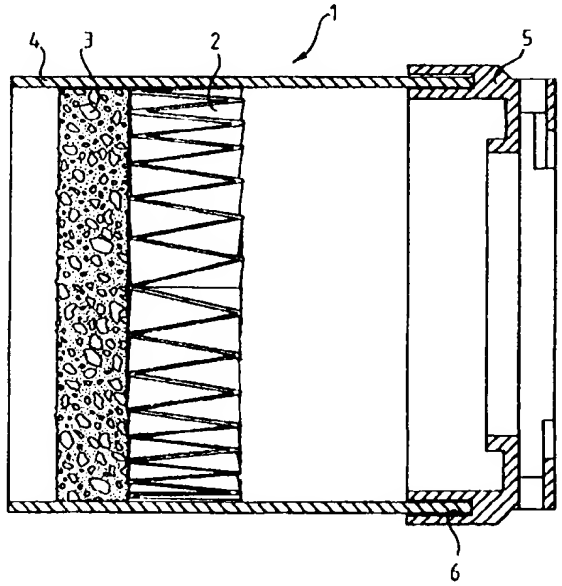
**Published**
*With international search report.*
*In English translation (filed in Swedish).*

(54) Title: EXHAUST GAS FILTER TEMPORARILY ARRANGED AT A VEHICLE EXHAUST PIPE




(57) Abstract

The invention relates to a device for cleaning exhaust gases from vehicles, especially cars, which is intended to be temporarily arranged adjacent to the exhaust pipe of the vehicles, comprising a filter unit (1) with a first part (2) for separation of particles and a second part (3) for separation of gaseous pollutants, such as hydrocarbons. The filter unit also comprises a filter housing (4), in which the first (2) and second (3) parts are arranged. The filter unit (1) is made of a material which is completely destructible by means of incineration, while the second part (3) comprises a body, containing immobilised activated carbon evenly distributed in the body.

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Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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# EXHAUST GAS FILTER TEMPORARILY ARRANGED AT A VEHICLE EXHAUST PIPE

## Field of the Invention

The present invention relates to a device for cleaning exhaust gases from vehicles, especially cars, which is intended to be temporarily arranged adjacent to the exhaust pipe of the vehicle, comprising a filter unit with a first part for separation of particles and a second part for separation of gaseous pollutants, such as hydrocarbons, the filter unit also comprising a filter housing, in which the first and second parts are arranged. This exhaust gas cleaning device is preferably intended to be used as a temporary filter for separating particulate and gaseous pollutants from vehicles when they are transported from vehicle manufacturing plants or when they are driven indoors, for example in car showrooms and workshops.

## Background of the Invention

Presently, in order to avoid exhaust gases in, for example, a car showroom use is made of exhaust gas cleaning devices which are temporarily arranged on the exhaust pipe of the cars. These devices usually have a particle filter for separating particulate pollutants as well as a carbon filter for removing gaseous pollutants. Since new engines contain a large amount of hydrocarbons, the carbon filters of the exhaust gas cleaning devices have a short life and, consequently, the devices can only be reused a small number of times.

One problem associated with this technology is thus that a large number of polluted exhaust gas cleaning devices are produced, which because of their carcinogenic contents of polycyclic aromatic hydrocarbons are designated as hazardous waste and which, accordingly, cannot be deposited at an ordinary municipal refuse tip.

Another problem associated with the carbon filters of prior art exhaust gas cleaning devices is that the degree of separation of the gaseous pollutants is low.

Summary of the Invention

The object of the present invention is to solve the problems described above by simplifying the disposal of the exhaust gas cleaning devices after use as well as increasing the degree of separation of the gaseous pollutants.

This object is achieved according to the invention by a device of the type described in the introductory paragraph, characterised in that the filter unit is made of a material which is completely destructible by means of incineration and that the second part comprises a body, containing immobilised activated carbon evenly distributed in the body.

Since the filter unit of the device is composed of a material which is completely destructible by means of incineration, the entire filter unit can be incinerated in a conventional refuse incinerator, whereby the material including the harmful hydrocarbons is decomposed into innocuous, gaseous residual products.

That fact that said body contains evenly distributed activated carbon results in better utilisation of the activated carbon. Moreover, since the activated carbon is immobilised, high and safe gas filtering is achieved with no risk of gas leakage due to settlements in the carbon body. In other words, compaction of carbon particles is prevented during operation. Compaction of the carbon particles is undesirable since it would result in the formation in the carbon body of areas without carbon particles and consequently without the ability to separate gaseous pollutants, i.e. the gaseous pollutants would not be removed from the part of the exhaust gases which would flow through these areas. The total degree of separation would thus be relatively low.

The filter unit of the device preferably comprises a filter housing, in which the first and second parts can be arranged.

The filter housing is made of a material which is completely destructible by means of incineration. The filter housing can be made of cardboard or of a combustible polymer, such as a recovered polymer or polypropylene. The filter housing is suitably made in the shape of a tube or a sleeve.

Said body preferably comprises an activated carbon combined with a carrier material and the activated carbon is suitably cross-linked with a polymer.

Said first part preferably comprises a microfilter, such as a HEPA filter.

The first and second parts are suitably attached to the filter housing by means of gluing.

The device preferably comprises a fastening member for attaching the filter unit to the exhaust gas system of the car by means of an adapter.

The fastening member can be made of a material which is completely destructible by means of incineration, such as a combustible polymer. The polymer may consist of a recovered polymer or polypropylene.

Brief Description of the Drawings

The invention will be described in more detail below with reference to the accompanying schematic drawing, which by way of example shows a part section of a presently preferred embodiment of the device according to the invention.

Description of a Preferred Embodiment

The device according to the preferred embodiment comprises a filter unit 1 with a first part 2 for separation of particles present in exhaust gases from a vehicle, such as a car, (not shown) as well as a second part 3 for separation of gaseous pollutants present in these exhaust gases, such as polycyclic aromatic hydrocarbons. The first part comprises a microfilter 2, such

as a HEPA filter, in the form of a pleated filter sheet made of a fibre material, such as polyester. The second part, however, comprises a carbon body 3 containing immobilised activated carbon evenly distributed in the body. The activated carbon is cross-linked with a polymer in order to form of a homogeneous, self-supporting round of activated carbon.

Furthermore, the filter unit comprises a filter housing 4 in the form of a cardboard tube, in which the microfilter 2 and the carbon body 3 are arranged. More specifically, the microfilter and the carbon body are bonded to the inside of the cardboard tube by means of hot melt adhesive in such a way that they abut against each other and, moreover, from the point of view of the flow direction of the exhaust gases, indicated by the flow arrow F in the drawing, the carbon body is located downstream of the microfilter. On the side which does not abut against the microfilter, the carbon body is located a short distance upstream of the downstream end of the cardboard tube. Furthermore, the inside of the cardboard tube is coated with a layer of, for example, silicate paint in order to enable the hot exhaust gases to flow through the cardboard tube without destroying it while at the same time ensuring that the tube is destructible by means of conventional waste incineration.

The device also comprises a fastening member 5, which is provided with a surrounding track 6 at its downstream end, in which track the downstream end of the cardboard tube 4 is attached by means of a hot melt adhesive. At its upstream end, the fastening member is attached to the exhaust pipe of a vehicle by the intermediary of a conventional adapter (not shown), the fastening member being attached to the adapter by means of, for example, a bayonet catch. The fastening member is made of a material which is completely destructible by means of incineration, such as polypropylene or a recovered poly-

mer consisting of a mixture of conventional recovered plastics, such as HDPE, LDPE, PP, etc.

In use, the exhaust gas cleaning device is thus arranged adjacent to the exhaust pipe of the vehicle and exhaust gases flow through it when the vehicle is being driven in, for example, a car showroom. When the exhaust gases first pass through the microfilter 2 of the filter unit 1, their particulate pollutants, such as soot particles, are separated first. Subsequently, their gaseous pollutants, such as polycyclic aromatic hydrocarbons, are separated from the exhaust gases in the carbon body 3 of the filter unit 1. Since the activated carbon particles of the carbon body are evenly distributed in the entire body and since they are also locked in position, compaction of the same is avoided, whereby it is ensured that the entire exhaust gas flow must pass through the adsorbing carbon particles. In this way, high separation of gaseous pollutants is achieved.

Subsequently, when the vehicle is to be delivered to the buyer in question, the exhaust gas cleaning device is removed together with the adapter from the exhaust pipe of the vehicle and is reused on another vehicle. Since there is a large amount of hydrocarbons in new engines the exhaust gas cleaning device can only be reused a few times if it is mostly used in connection with new vehicles. When the exhaust gas cleaning device is considered worn out it is removed from the adapter and destroyed by means of incineration, which is possible since the entire exhaust gas cleaning device is made of combustible materials.

It will be appreciated that a number of modifications of the embodiment described above are possible within the scope of the invention as defined by the appended claims. For example, the microfilter 2 and the carbon body 3 can be mounted inside the filter housing 4 by means of a conventional rubber seal. Furthermore, the filter housing 4 can be in the shape of a sleeve, which

can be made of a combustible polymer, such as polypropylene or a recovered polymer. Moreover, the filter housing and the fastening member can be made in one piece and, in that case, are suitably made of a polymer. It is also possible to design the exhaust gas cleaning device according to the present invention in such a way that only the microfilter 2 and the carbon body 3 are replaced when the degree of separation of particles and/or gaseous pollutants is below predetermined limit values, i.e. the filter housing and the fastening member are provided with a new microfilter and a new carbon filter. In the latter variant, the filter unit which is completely destructible by means of incineration only comprises the microfilter and the carbon body. It is also possible to provide the exhaust gas cleaning device with a transportation safety device in the form of a plastic cover, which is placed inside the filter housing 4 downstream of the carbon body 3 prior to using the exhaust gas cleaning device.

CLAIMS

1. A device for cleaning exhaust gases from vehicles, especially cars, adapted to be temporarily arranged adjacent to the exhaust pipe of the vehicles and comprising a filter unit (1) with a first part (2) for separation of particulate pollutants and a second part (3) for separation of gaseous pollutants, such as hydrocarbons, the filter unit also comprising a filter housing (4), in which the first (2) and second (3) parts are arranged, c h a r a c t e r i s e d in that the filter unit (1) is made of a material which is completely destructible by means of incineration, and the second part (3) comprises a body containing immobilised activated carbon evenly distributed in the body.

2. A device according to claim 1, c h a r a c t e r i s e d in that the filter housing (4) is made of a material which is completely destructible by means of incineration.

3. A device according to claim 2, c h a r a c t e r i s e d in that the filter housing (4) is made of board.

4. A device according to claim 2, c h a r a c t e r i s e d in that the filter housing (4) is made of a combustible polymer.

5. A device according to claim 4, c h a r a c t e r i s e d in that the filter housing (4) is made of a recovered polymer or polypropylene.

6. A device according to any one of claims 2-5, c h a r a c t e r i s e d in that the filter housing is made in the shape of a tube (4) or sleeve.

7. A device according to any one of the preceding claims, c h a r a c t e r i s e d in that said body (3) comprises activated carbon combined with a carrier material.

8. A device according to claim 7, c h a r a c - t e r i s e d in that the activated carbon is cross-linked with a polymer.

9. A device according to any one of the preceding claims, c h a r a c t e r i s e d in that said first part comprises a microfilter (2), such as a HEPA filter.

10. A device according to any one of claims 2-9, c h a r a c t e r i s e d in that the first (2) and the second (3) parts are attached to the filter housing (4) by means of gluing.

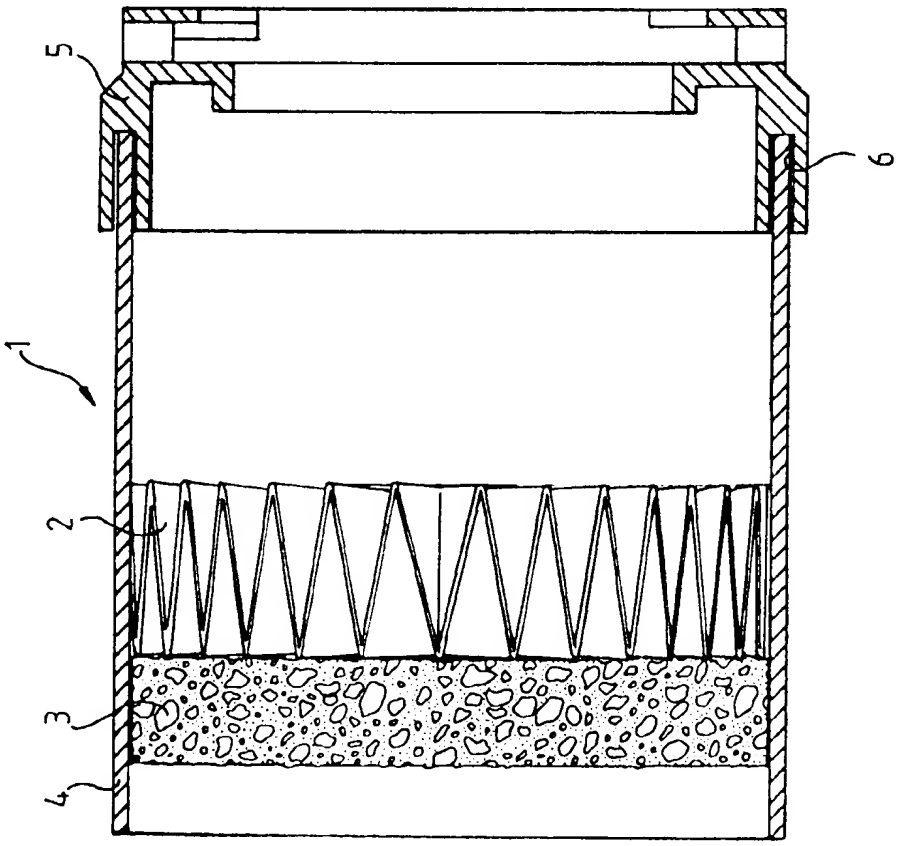
11. A device according to any one of the preceding claims, c h a r a c t e r i s e d by a fastening member (5) for attaching the filter unit (1) to the exhaust gas system of the vehicle in question by means of an adapter.

12. A device according to claim 11, c h a r a c - t e r i s e d in that the fastening member (5) is made of a material which is completely destructible by means of incineration.

13. A device according to claim 12, c h a r a c - t e r i s e d in that the fastening member (5) is made of a combustible polymer.

14. A device according to claim 13, c h a r a c - t e r i s e d in that the polymer consists of a recovered polymer.

15. A device according to claim 13, c h a r a c - t e r i s e d in that the polymer consists of polypropylene.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PATENT COOPERATION TREATY

# PCT

REC'D 20 JUL 2000

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference 2996154 | **FOR FURTHER ACTION** | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| International application No. PCT/SE99/00500 | International filing date *(day month year)* 26.03.1999 | Priority date *(day month year)* 27.03.1998 |
| International Patent Classification (IPC) or national classification and IPC7 F01N 3/24, B01D 27/08 | | |
| Applicant SCANDFILTER AB et al | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 27.10.1999 | 05.07.2000 |
| Name and mailing address of the IPEA/SE<br>Patent- och registreringsverket<br>Box 5055<br>S-102 42 STOCKHOLM<br>Telex 17978 PATOREG-S<br>Facsimile No. 08-667 72 88 | Authorized officer<br>Marianne Bratsberg/MP<br>Telephone No. 08-782 25 00 |

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE99/00500

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,
pages _____, filed with the letter of _____.

☐ the claims, Nos. _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of _____,
Nos. _____, filed with the letter of _____.

☐ the drawings, ~~sheets~~/fig _____, as originally filed,
~~sheets~~/fig _____, filed with the demand
~~sheets~~/fig _____, filed with the letter of _____,
~~sheets~~/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, ~~sheets~~/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

ational application No.
PCT/SE99/00500

**V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Claims | 1-15 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1-15 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1-15 | YES |
| | Claims | | NO |

2. Citations and explanations

The invention relates to a filtering device for cleaning exhaust gases from vehicles. The filtering device, which consists of a particle filter and a part for separation of gaseous pollutants contained in a housing, is intended to be temporarily arranged adjacent to the exhaust pipe. The filtering device is made of a material, which is completely destructible by means of incineration.

Most relevant document cited in the International Search Report:

D1: WO8603802

D1 describes a filtering device intended to be attached temporarily to an exhaust pipe. The device is intended to be simple to mount and dismount on the exhaust pipe and to be manufactured so cheap it can be used as a disposable article. The device consists of a glass fibre section to filter particles and a section of active carbon to filter gaseous pollutants.

The invention according to claim 1 differs from the device described in D1 in that the filtering device is made of a material, which is completely destructible by means of incineration. There is nowhere indicated in D1 that the device should be construed of such a material and the problem of taking care of the device after it has served its time is not discussed. Hence, there is nothing described in D1 that would guide a person skilled in the art to end up at the claimed invention.

Hence, the invention according to claim 1 and thereupon depending claims 2-15 is novel and regarded to involve an inventive step.

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00500

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F01N 3/24, B01D 27/08
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: F01N, B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 8603802 A1 (JOHNSSON ROLF), 3 July 1986 (03.07.86), claim 3, abstract<br>-- | 1 |
| A | GB 2030221 A (GIUSEPPE URSO), 2 April 1980 (02.04.80), abstract<br>-- | 1 |
| A | FR 2580030 B (ROMANOS WARDE), 10 October 1986 (10.10.86), claims 1-4<br>--<br>-------- | 1 |

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 19 May 1999 | 15 -06- 1999 |
| Name and mailing address of the ISA/<br>Swedish Patent Office<br>Box 5055, S-102 42 STOCKHOLM<br>Facsimile No. + 46 8 666 02 86 | Authorized officer<br>Britt-Marie Lundell<br>Telephone No. + 46 8 782 25 00 |

Form PCT/ISA/210 (second sheet) (July 1992)

## INTERNATIONAL SEARCH REPORT

Information on patent family members

03/05/99

International application No.
PCT/SE 99/00500

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| WO 8603802 A1 | 03/07/86 | AT 41475 T | 15/04/89 |
| | | AU 584375 B | 25/06/89 |
| | | AU 5142985 A | 26/06/86 |
| | | BR 8407379 A | 03/11/87 |
| | | BR 8504994 A | 21/01/86 |
| | | CA 1270771 A | 26/06/90 |
| | | DK 437385 A | 27/09/85 |
| | | EP 0169877 A | 05/02/86 |
| | | EP 0236295 A,B | 16/09/87 |
| | | SE 0236295 T3 | |
| | | FI 92240 B,C | 30/06/94 |
| | | FI 853778 A | 30/09/85 |
| | | FI 872654 A | 15/06/87 |
| | | JP 6021536 B | 23/03/94 |
| | | JP 62501159 T | 07/05/87 |
| | | SE 8400433 A | 31/07/85 |
| | | US 4706455 A | 17/11/87 |
| | | WO 8503241 A | 01/08/85 |
| GB 2030221 A | 02/04/80 | DE 2930762 A | 14/02/80 |
| | | FR 2432610 A | 29/02/80 |
| | | JP 55025593 A | 23/02/80 |
| | | SE 7906560 A | 05/02/80 |
| FR 2580030 B | 10/10/86 | NONE | |